CLAIMS

What is claimed is:

1. An isolated and purified mutant gene encoding a isoxaben resistant cellulose synthase comprising a cellulose synthase gene with a specified nucleic acid sequence.

2. The mutant gene of claim 1, wherein the nucleic acid sequence comprises the nucleotide sequence of SEQ ID NO: 1, or degenerate variant of SEQ ID NO: 1.

3. The mutant gene of claim 1, wherein the nucleic acid sequence comprises at least 20 contiguous nucleotides of SEQ ID NO: 1, including nucleotides 3160-3162 of SEQ ID NO:1.

4. The mutant gene of claim 1, wherein the nucleic acid sequence comprises the nucleotide sequence of SEQ ID NO: 2, or degenerate variant of SEQ ID NO; 2.

5. The mutant gene of claim 1, wherein the nucleic acid sequence comprises at least 20 contiguous nucleotides of SEQ ID NO: 2, including nucleotides 2992-2994 of SEQ ID NO: 2.

6. The mutant gene of claim 1, wherein the nucleic acid sequence comprises the nucleotide sequence of SEQ ID NO: 3, or degenerate variant of SEQ ID NO; 3.

7. The mutant gene of claim 1, wherein the nucleic acid sequence comprises at least 20 contiguous nucleotides of SEQ ID NO: 3, including nucleotides 2992-2994 and 3160-3162 of SEQ ID NO: 3.

8. The mutant gene of claim 1, wherein the nucleic acid sequence comprises the nucleotide sequence of SEQ ID NO: 4, or degenerate variant of SEQ ID NO; 4.

9. The mutant gene of claim 1, wherein the nucleic acid sequence comprises at least 20 contiguous nucleotides of SEQ ID NO: 4, including nucleotides 3160-3162 of SEQ ID NO: 4.

10. The mutant gene of claim 1, wherein the nucleic acid sequence comprises the nucleotide sequence of SEQ ID NO: 6, or a degenerate variant of SEQ ID NO; 6.

11. The mutant gene of claim 1, wherein the nucleic acid sequence comprises at least 20 contiguous nucleotides of SEQ ID NO: 6, including nucleotides 2292-2294 of SEQ ID NO: 6.

12. The mutant gene of claim 1, wherein the mutant gene encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 5, or a fragment thereof at least 60 residues in length inlcuding residues 998, wherein there is a first amino acid substitution at residue 998 of SEQ ID NO: 5.

13. The mutant gene of claim 12, wherein said first substituted amino acid residue is chemically equivalent to aspartic acid.

14. The mutant gene of claim 12, wherein said first substituted amino acid residue is glycine in the corresponding wild-type cellulose synthase and aspartic acid in the resistant cellulose synthase.

15. The mutant gene of claim 12, wherein the mutant gene also encodes a polypeptide comprising the amino acid sequence of SEQ ID NO: 5, or a fragment thereof at least 60 residues in length inlcuding residues 942-998, wherein there is a second amino acid substitution at residue 942 of SEQ ID NO: 5.

16. The mutant gene of claim 15, wherein said first substituted amino acid residue is chemically equivalent to isoleucine.

17. The mutant gene of claim 15, wherein said second amino acid substitution is threonine in the corresponding wild-type cellulose synthase and isoleucine in the resistant cellulose synthase.